

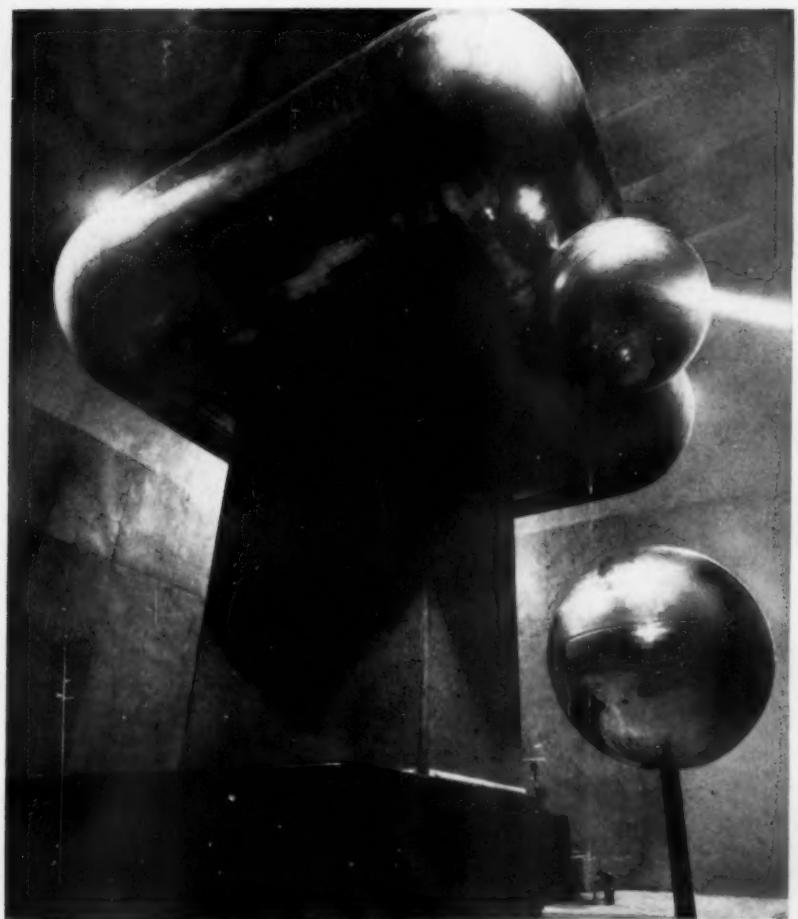
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THE WEEKLY SUMMARY OF CURRENT SCIENCE.



OCTOBER 17, 1936

Disease Weapon

See Page 248

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Vol. XXX



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DO YOU KNOW?

There are over 6,000 sizes and shapes of tin cans.

A chameleon's darting tongue can be extended longer than the animal's whole body.

A powerful electro-magnet was used recently to draw out five tiny sharp needles embedded in a mill worker's hand.

The French government is restoring the famous ruins of Baalbek in Syria, bringing more of the temple walls and columns out of ancient wreckage.

Seeking suitable material for spinners, the rayon industry in this country has found a gold-platinum alloy the most satisfactory.

Popularity of chemistry is suggested by a survey showing that in 80 women's colleges, 11 per cent of students took the first general course in this science.

Whether the fox is a useful wild life citizen or a nuisance is a never-settled argument among hunters, farmers, and naturalists, but a recent study of the feeding habits of foxes suggests that B'r Fox inclines to the useful side.

There are now more bald or American eagles in Florida than in any other state.

British weather men have sent instruments to America to collect samples of air from the American stratosphere.

An automobile that used a moth repellent for fuel was turned out in the eighteen nineties, but the fumes made it unpopular.

Hot weather last summer caused numerous "blowups" on midwestern highways, resulting in shattered pavement and hurry calls for road repairs.

Chocolate drunk by Mexican Indians was flavored with spices, honey, herbs and other ingredients well mixed, and was served cold without any cooking.

A new clinic at the University of Chicago, the Zoller Memorial Dental Clinic, will make special effort to bridge the gap between medical and dental research.

Since ephedrine has gained wide use in treating nasal ailments, the Chinese scientist who isolated it from a wild Chinese herb is seeking possibilities in other Eastern herb remedies.

WITH THE SCIENCES THIS WEEK

Most articles are based on communications to Science Service or papers before meetings, but where published sources are used they are referred to in the article.

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Is the birth rate in the United States declining? p. 254.

ANTHROPOLOGY

Find Biggest Head in America; Belonged to Brainy Alaskan

Distinction Formerly Belonging to Daniel Webster Now Goes to Unknown Aleut With 2,005 CC. Skull

SCIENCE has discovered America's brainiest man.

He lived and died hundreds of years ago, and his immense skull has now come to light through archaeological digging in Alaska. Dr. Ales Hrdlicka of the Smithsonian Institution reports the discovery as a notable one from his expedition to the Aleutian Islands of Alaska, this summer.

America's greatest big-head, thus revealed as a man of the Aleutian Islands, had a skull shaped to hold a brain of fully 2,005 cubic centimeters. The average human has no more than 1,450 cubic centimeters of brain if he is a man. A woman averages less, about 1,250 to 1,300.

Dr. Hrdlicka compares this big-brained American to other notable brains on record. Daniel Webster is credited

with the largest normal head of all Americans within historic times. But his massive brain was smaller than the Aleut's, being about 2,000 cubic centimeters. Bismarck's brain is estimated to have been about 1,965; Beethoven's, 1,750. The Russian poet Turgeniev, with a huge brain of 2,030 cubic centimeters, still holds the entire world record in this respect, though the American discovery comes close.

Normal

The new-found American skull, only a trifle smaller than Turgeniev's, is pronounced entirely normal by Dr. Hrdlicka. Examination convinces the anthropologist that the man who carried the massive head on his shoulders was no sufferer from any such head-deforming malady as water on the brain, or the thickened bones of gigantism. He was not a person of great size or strength, judging by the moderate size of the bones for muscle attachments. He was, it is believed, a brainy man in intelligence as well as in sheer quantity of brain matter.

There is a rough but definite correlation between brain size and intelligence in normal human beings, Dr. Hrdlicka explains. Brain size, he points out, is the most essential physical difference between man and beast.

AMERICAN HEAD SIZES

The largest normal American skull, found in the Aleutian Islands, is shown at the right. It has a brain capacity of 2,005 cubic centimeters. The smallest known skull of any normal American, left, belonged to a prehistoric Peruvian Indian, and had only 910 cubic centimeters capacity. Compared with these extremes is the average sized skull in the center, with about 1,400 cubic centimeters capacity.

In the National Museum's rare scientific collection of 16,000 skulls, the largest such collection in the world, the smallest normal adult skull of a human being is capable of holding no more than 910 cubic centimeters of brain. This is close to the edge of the gulf separating man from ape, so far as brain size is concerned.

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MEDICINE

Migraine Relief Reported From Alkaloid Drug

MANY persons with migraine, or "sick headache," may find quick relief in a drug known as ergotamine tartrate, reports Dr. Mary E. O'Sullivan of Bellevue Hospital, New York City.

Dr. O'Sullivan has by this treatment saved 89 migraine patients from "39,000 hours of suffering in the last two years," she tells physicians (*Journal, American Medical Association*, Oct. 10).

The alkaloid, ergotamine tartrate, is not a cure for migraine, the woman physician emphasizes, but it has brought relief to all but eight out of 97 patients who have been treated. It completely checked 1,042 headaches in the 89 patients discussed.

The drug is injected under the skin by the physician, or it may be taken, somewhat less dependably, in tablet form. It should not be taken except under a doctor's orders.

"Any disease that will incapacitate an adult, interfering with his work for a day or more from one to four times a month, is a definite economic liability," says Dr. O'Sullivan. She and others are at work on the cause of migraine under a grant from the Josiah Macy Foundation.

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PHYSIOLOGY

Can Tell Baby's Chance of Survival from Blood Oxygen

Lack of Precious Gas Before Birth May Cause Permanent Damage; Lowering After Birth Brings Death

A NEW-BORN baby's chance for survival can be told from the oxygen content of its blood, Sir Joseph Barcroft, Cambridge University professor, said in a lecture at Yale University.

If at any time after birth the oxygen in the baby's blood falls even for a short period of time below the saturation point it reached before birth, the infant is incapable of later making up for this deficiency. Its ability to make a successful adjustment to its environment, in other words to live outside the mother's body, is decidedly lowered.

The way the baby breathes does not give any indication of its survival, Sir Joseph pointed out. He studied the blood and the first gasping breaths of new-born lambs. Before birth the lamb's blood contained about 40 per cent of oxygen. Immediately after birth the oxygen content climbed to 95 per cent, enabling the lamb to continue its life in a much drier, cooler atmosphere.

In the case of one lamb that had a difficult passage into life, the oxygen saturation before tying off the cord was between 30 and 40 per cent, but dropped to an almost negligible amount within two minutes, in spite of the fact that the lamb had given a few gasps. This lamb died the night following its birth.

A second lamb, which survived, had sufficiently effective breathing from the start to keep the saturation of oxygen in its blood from ever falling below the figure shown before birth.

Two Ways to Breathe

The new-born animal seems to be capable of two forms of breathing. One is of a gasping type and seems to be due to lack of oxygen, temporary asphyxia. If the gasping continues, one gasp following another with increasing frequency, a regular rhythm of breathing is set up.

This gasping type of drawing the vital first breaths is apparently a second line of defense and comes into play when the nervous system is too unresponsive for breathing to start from milder stimulus than asphyxia.

The other type of breathing described

by Sir Joseph is relatively rapid and shallow. It often appears as a result of stimulation of the body surface, such as cooling and drying of the skin, but may come in response to other stimulation.

"This rapid shallow rhythm," Sir Joseph said, "seems to be particularly associated with swallowing movements; sometimes indeed it is confined to the throat; at others it spreads over the whole chest."

"Which type of respiration is exhibited by any particular lamb seems to depend upon the condition of its nervous system. If the nervous system is highly excitable, cutaneous impulses will be effective and the breathing will be rapid and not specially deep."

How a short lack of oxygen before birth may permanently cripple the young animal or child was told by Sir Joseph when he described experiments in which oxygen was temporarily withheld from unborn lambs, to determine the effect on the embryo of changes in its environment.

Permanent Loss

The effect of this change is to "put back the clock" but the time lost in the embryo's development can never be regained. The brain and nerve centers have been permanently damaged by the temporary suppression of their development. Stimulus to the brain and nerve centers once produced potentially useful movements such as would help in breathing. After the clock was put back by withholding oxygen, stimulus produced only an irritability which Sir Joseph called "the first sign of nervous exhaustion."

Nature is a long-range planner, going in heavily for preparedness, it appeared from Sir Joseph's report. The brain and important nerves of an embryo are prepared to direct breathing and other vital activities 100 days before birth makes these activities necessary, Sir Joseph found.

A stimulus to an unborn lamb that has only lived one-third of its prenatal life produces a movement very much like that made when a new-born lamb first rises from the ground: the act of

rising first on its forelegs and subsequently on its hind legs. A slight stimulus at about this stage of the unborn lamb's development brings about rhythmic movements like those used in breathing, and a strong stimulus induces energetic movement giving the appearance of an animal out of breath as a result of effort.

None of these movements can be of any use to the unborn lamb, but it is prepared to make them long before the time when its life will depend on its ability to make these movements.

This tendency for something to be formed not at the time when it is needed but long in advance, Sir Joseph pointed out, cuts across the theory that stimulus to growth is use.

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ASTRONOMY

Burst of Light in Star in Constellation Cassiopeia

AN UNUSUAL outburst of light in the bright northern star, Gamma Cassiopeiae, was reported to the Harvard Observatory, distributing point for astronomical news in this hemisphere, by Dr. Nicholas Bobrovnikoff, acting director of Perkins Observatory, Delaware, Ohio.

Observed early Monday morning, October 5, by Dr. Ernest H. Cherrington, Jr., of the Perkins staff, the brightening may have very important astronomical consequences, it was declared. Astronomers throughout America are expected to watch the star. The outburst brought the magnitude of the star from 2.25 to 1.6, although the spectrum of the star, always very peculiar, showed no unusual characteristics. The next morning the star seemed to have returned to normal, temporarily at least, for neither its magnitude nor its spectrum shows any conspicuous deviation from the normal.

The star, one of the brightest in well-known Cassiopeia's chair, has been suspected of slight variability during the past century but heretofore no conspicuous brightening has been recorded. Small variations in the spectrum have been observed, however, and the star has been the subject of much research because of its spectral peculiarities. The spectrum is featured by bright lines of hydrogen, helium, and ionized iron and silicon.

How to find Gamma Cassiopeiae: Look at the Great Dipper. From its two pointer stars, get the position of the North Star. Just at present the Dipper is low, near the northern horizon, so that

the North Star will be almost directly above the pointers. Now keep on going, up the sky and a little to the east. At about the Dipper's distance, on the opposite side of the North Star, you will find a big, bright constellation shaped like a capital W, lying on one side.

This is Cassiopeia's Chair. The middle star of the five that form the W, situated on top of the "hump" of the letter, is Gamma Cassiopeiae. There can be no mistaking it once you've found it. (See SNL, Sept. 26, for sky map.)

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PHYSIOLOGY

Visual Purple Is Rebuilt In Experiments at Columbia

For the First Time, the 1878 Experiment of Kühne
Is Repeated Successfully and Visual Process Reversed

VISUAL PURPLE, a chemical compound in the eye, and necessary for seeing, has been made to rebuild itself in a test tube under controlled experimental conditions, in the laboratory of Prof. Selig Hecht of Columbia University.

This is the first time that the process has taken place under fully controlled conditions, which make its repetition possible. It is the first time since 1878 that visual purple has been regenerated at all, although many physiologists have tried without success to repeat the experiment of Dr. W. Kühne of Heidelberg University, who in that year reported having accomplished this very exciting biochemical feat.

Prof. Hecht's associates in his present research are Drs. Aurin M. Chase, Simon Shlaer, and Charles Haig. A report giving the principal technical details of their work is published in *Science* (October 9).

Dyestuff of Sight

Visual purple is a pinkish-purple pigment or dyestuff of involved chemical composition, found in the rod-cells of the retina, or light-sensitive layer of the eye. Both in the living eye, and when chemically extracted into a glass vessel, it loses its color when illuminated, first turning yellow and then completely colorless.

In the glass vessel, it has never been turned back to its original color again, except in the 1878 experiment of Dr. Kühne. But in the living eye the reaction is reversible, that is, if the light is shut off the visual purple forms itself anew from the colorless product of its photochemical breakdown.

Physiologists regard the success of Prof. Hecht and his associates in reversing the bleaching of visual purple at

will as a very substantial forward step toward the ultimate understanding of the process of seeing, because it is now possible to perform controlled experiments in one very vital part of that process, where experiments have been impossible until now.

Visual purple for the present research was obtained from the eyes of frogs. The animals were kept in the dark for several hours; then they were killed quickly, and the pigment removed from their eyes by appropriate chemical extraction processes.

More exact physical and chemical

measurements than have hitherto been possible in such studies have enabled these investigators to find the comparatively narrow range of conditions under which results can be obtained. The method of extraction had to be carefully controlled and the solution had to be kept near the neutral point chemically. Relatively slight deviations toward either the acid or the alkaline side prevented the regeneration of color in the bleached extract.

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ASTRONOMY

New Star Discovered Visible to Naked Eye

DISCOVERY of a "new star" or nova was reported from Tokyo to the international astronomical bureau in Copenhagen. It will be called Nova Sagittarii. As it is now sixth magnitude it is easily visible to the unaided eye. News of its discovery is being cabled to observatories throughout the world. The rise of a star from obscurity to brilliance, called a nova, signals a gigantic outburst by the star. The discovery was made on Tuesday, October 6.

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Some salt water fish visit fresh water regions in winter.



FOR ROAD OR AIR

This adaptable autogiro can be driven on the highway or through the city streets when its rotors are folded back. When it was recently delivered to the U. S. Department of Commerce for experimental purposes, it was landed in a small Washington park between the Treasury building (shown in the background) and the Commerce building. Then it was driven to the very door of the Department of Commerce.

ELECTROCHEMISTRY

Likelihood of Industrial Growth in Northwest Debated

Possibility of Great Power Center on Columbia River Cited; Another Sees Trend Toward Cheaper Coal Plants

THE POSSIBILITY of a new industrial "Niagara Falls" of the northwest United States was suggested in the technical paper presented to the Electrochemical Society by Carl F. Floe, assistant professor of metallurgy, State College of Washington. Prof. Floe pointed out that a great part of the immense hydroelectric power output of the government's Bonneville and Grand Coulee Dams on the Columbia River would be offered to the metal producing industries which use electricity in their processes just as they do in the Niagara Falls area.

Third of Water Power

One-third of the total water power in the United States is in the northwest area, said Prof. Floe. Location of aluminum industries near the Bonneville and Grand Coulee Dams is a possibility for the future. This will not come immediately, Prof. Floe explained, because there are no nearby deposits of aluminum ore.

There are very large deposits, however, of clay containing from 25 to 40 per cent aluminum oxide which could

become a source of aluminum metal as soon as suitable processes of treatment can be developed. This may come sooner than expected because of the rapid depletion of the high-grade bauxite deposits of the United States.

While at present unable to compete with existing sources, the presence of cheap power and large deposits of magnesium carbonate in the Northwest may some day find magnesium metal being manufactured there. The rapid expansion of the demands for magnesium may make such production feasible in the future.

Copper and zinc production may some day be added to possible metals industries of the Northwest, continued Prof. Floe.

Calcium carbide is used to the extent of from 10,000 to 15,000 tons on the Pacific Coast, but little is produced there despite the presence of the two needed raw materials, high-grade limestone and coke. With cheap electric power there is no reason why such an industry should not come into being.

Economics of Power

In contrast to Prof. Floe's rosy vistas for new industries in the Northwest, L. W. W. Morrow, editor of *Electrical World*, maintained that cheap power is not a dominant factor in the location of an industrial plant and that, in fact, power costs are about the same the country over.

Power is cheapest and best when the plant using it is located near the source.

It is unlikely, Mr. Morrow added, that industry will move to the new hydroelectric power plants.

The point, he maintained, is that it costs about 2.5 times as much to transmit electricity for distances from 50 to 100 miles as it does to move coal by rail that distance and it is therefore economical to build a smaller coal burning power plant at the factory. With coal seemingly now sufficient for the next 5,000 years, Mr. Morrow sees trends toward the less expensive and better operating fuel-burning power plants rather than toward hydro plants.

METEOROLOGY

New "Sky-High" Observatory For Weather Bureau

Nearer the sky than any other weather observatory in the eastern United States, a new Weather Bureau station has been set up on the summit of Mt. Mitchell, near Asheville, N. C. It is under the charge of Ed Wilson, forest warden, and Warren Jones. The two men will spend their entire time on this peak, loftiest mountain east of the Rockies. Every six hours they will send reports by telephone and telegraph to the Weather Bureau observatory at Atlanta. These "sky-high" meteorological observations are expected to be of particular value in connection with commercial aviation in the East and Southeast.

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Calcium Carbide

How the early attempts to make aluminum metal from alumina led to the unwitting production of calcium carbide was traced by R. A. Witherspoon and A. F. G. Cadenhead of the Shawinigan Chemicals, Ltd., of Montreal, Canada.

The outgrowth of this commercial manufacture of calcium carbide did four things for modern industry, they pointed out. First it created a demand and need for large electrical equipment, especially in transformers.

In the formation of carbide the power of Niagara Falls was transmitted chemically to out-of-the-way settlements and mines where the acetylene gas generated from it was used for illumination. Then, as other forms of lighting superseded acetylene, the carbide furnaces and their operating techniques were carried over into the manufacture of the various ferro alloys such as ferro silicon and ferro manganese.

Another contribution of the carbide industry was in the development of oxyacetylene welding and cutting.

For Explosive and Planes

By the time the World War came along acetylene was in demand for the manufacture of synthetic organic chemicals. The British, for example, wanted large quantities of acetone for the manufacture of the explosive cordite. Then, too, during the war, there came a great demand for airplane "dope" of cellulose acetate to coat the fabric of airplane wings. Large quantities of acetic acid were therefore necessary and the acetic acid was produced from acetylene.

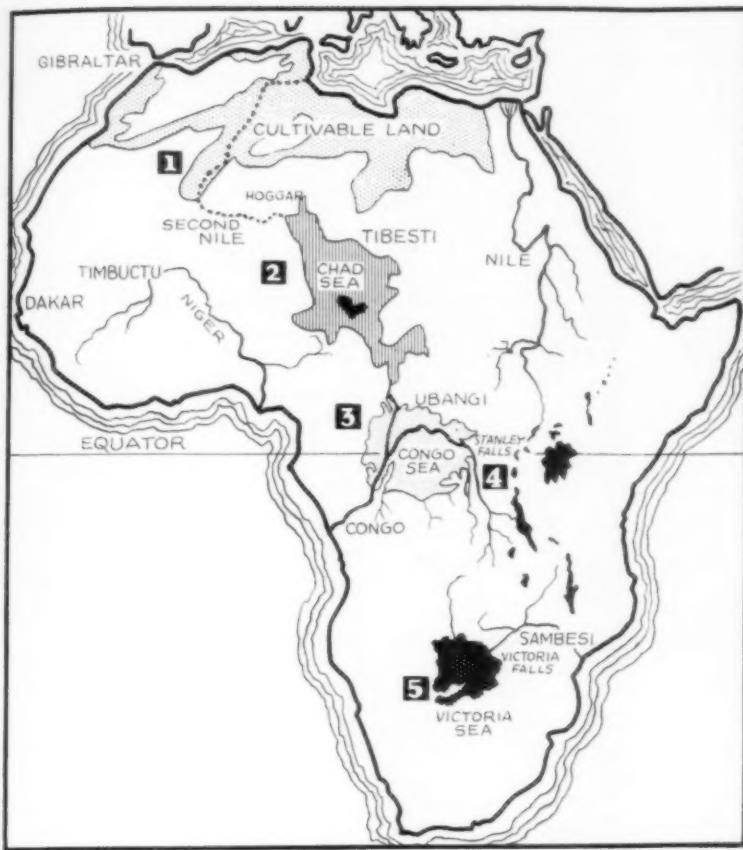
But with the letdown from wartime production in 1918 there soon arose another use for acetic acid in the production of artificial silk or celanese.

Here are the chemical steps which turn calcium carbide, which you can burn in a lamp, into a pair of synthetic silk stockings.

Carbide mixed with water makes acetylene gas. Acetylene gas plus water makes acetaldehyde. Combine the acetaldehyde with oxygen and you get acetic acid. Two molecules of acetic acid robbed of one molecule of water creates acetic anhydride which has the ability to combine with pure cellulose to form cellulose acetate (airplane dope). Cellulose acetate forced through tiny spinnerets can produce threads of gossamer fineness that can be woven into the finest hosiery.

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Natives of Malekula in the South Seas still eat their enemies in ritual feasts.



THE PLAN

How Africa would look under new German plan. 1. Proposed new river like the Nile. 2. Lake Chad would become great inland sea. 3. Congo River would have dam and hydroelectric plant here. 4. Large Congo Sea would form here below Stanley Falls. 5. Victoria Sea would be formed by dam on Zambezi River.

ENGINEERING

Giant Chain of Great Lakes Proposed for Interior Africa

THAT Chancellor Adolf Hitler's recent demands for a German colonial empire in Africa may have other aspects besides the expressed desire for land where raw materials can be grown, is seen in an engineering proposal for a "Great Lakes" system in Africa.

The three proposed inland seas in the heart of the dark continent would, it is believed, turn barren lands into fertile arable soil and make accessible areas now remote.

As much as anything, the proposal is advanced to supply an outlet for the crowded European populations that may otherwise butcher each other in futile profitless wars.

Hermann Soergel, a German architect, is the originator of the Great-Lakes-in-Africa plan.

A single great dam only two and one-half miles long would create the northern pair of African Great Lakes, says Herr Soergel. This dam, thrown across the Congo river at a narrow spot in its outlet valley, would back the sixty- to eighty-inch annual rainfall of the equatorial African region into the low-lying Congo basin, which in past ages was a tremendous inland sea. This ancient sea would be re-created, with an area of nearly 350,000 square miles, or nearly four times the combined area of all the American Great Lakes.

This "Congo Sea" could be formed alone, and the surplus water permitted to drain down the present Congo river channel—of course with the generation of considerable water power. Or, an outlet could be arranged toward the north,

MEDICINE

X-Rays Cure Tongue Cancer Memorial Hospital Reports

ACCESSIBLE cancers of the tongue can now be cured with only a few doses of low voltage X-rays, it was announced by Memorial Hospital, New York, where research leading to improved methods of treating cancer is being carried on by many scientists.

Formerly in cases of cancer of the tongue it was necessary to remove the entire tongue. Later radium needles were inserted and, while these cured the condition in many cases, the treatment was painful and not always satisfactory. Effective use of low voltage X-rays for this purpose has been developed within the last year.

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and the water used to create a second inland sea of about the same size, centered around the present Lake Chad. This sea would extend far up into the Sahara, as far as the Ahaggar region.

From the projected "Chad sea" the drainage would be toward the Mediterranean, taking advantage of dry river channels, or "wadys" in the desert. The "second Nile" thus formed would flow first west, then northerly, and finally almost due east through the French colony of Tunis into the Gulf of Gabes. Through most of the northern part of its course it would flow through land capable of irrigation.

To carry out this scheme, a high degree of international cooperation would be necessary, for Belgian, French and British territory is involved, plus possibly Italian lands in Libya for which irrigation water might be provided. Herr Soergel, interested mainly in the engineering and geographical aspects of his proposal, simply assumes that these one-time allies in war might be able to arrange a more lasting and profitable alliance for the purposes of peace.

The third of the African Great Lakes could be "all British," and would in any event have no connection with the other two. It could be created by a suitable dam above the Victoria falls on the Zambezi river in Rhodesia, and the "Victoria sea" would back up into part of what is now the Kalahari desert.

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Binding a child's head to make it grow in a long, sugar-loaf shape was done in regions of France within the past 100 years.

ROENTGENOLOGY

**Million-Volt X-Ray Tube
Soon To Be Ready for Use**

See Front Cover

AN ELECTROSTATIC generator capable of producing ultra-powerful X-rays at a potential of one million volts, expected to be the most powerful tool science has for cancer treatment, was announced before the American Roentgen Ray Society by Dr. Richard Dresser of the Huntington Memorial Hospital, Boston, where the equipment is being installed.

Designed by Dr. John G. Trump of the Massachusetts Institute of Technology, the new generator has two advantages over existing equipment. First, the more penetrating high voltage rays are better able to treat deep seated malignancies. Second, high voltage rays are more specific in their action in diseased tissue than the relatively low ones.

The new generator's tremendous power is indicated by Dr. Dresser's prediction that it will be able to produce a greater intensity of gamma rays than the combined output of all the available radium in the world.

Nearly 15 feet on a side, it appears like a giant mushroom of polished aluminum. Its operation is similar in principle to the generator of Dr. Robert Van de Graaff of M.I.T., in that both are essentially belt conveyors of electricity. It is expected to be ready for operation late this winter.

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PHYSIOLOGY

**Wind Does Not Burn, Tests
In Wind Tunnel Show**

WIND alone does not burn the skin. Cases of windburn, so-called, are really cases of sunburn in which the wind has helped the sun along by making the skin more susceptible to the ultraviolet rays of the sun. Wind-tunnel experiments supporting this belief are reported by Dr. W. H. Crew of New York University and Dr. C. H. Whittle of Addenbrooke's Hospital, Cambridge, England (*Science*, Oct. 2).

In one of the experiments, one of the investigators exposed his forearm to the blast of a 40-mile per hour wind in an experimental wind tunnel. The forearm was covered by automobile tire inner tubing except for a small area about one inch square where the rubber was cut away, leaving the bare skin exposed to the blast. No ultraviolet light

was present to reach the bare skin.

"During the half-hour exposure to the blast the skin exhibited 'gooseflesh,'" the report states, "but at no subsequent time was there the slightest evidence of reddening or chapping of the exposed area of the skin."

Cases of wind having caused burning of the skin are due, in their opinion, to the wind's having made the skin more susceptible to the ultraviolet rays by changing the temperature and moisture of the skin and by suppressing perspiration. Perspiration, they found in other experiments, can provide some protection from the actinic rays of sunlight.

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PHYSIOLOGY-PSYCHOLOGY

Wide Difference Found in Ability To Judge Loudness

THE NEXT time your neighbors turn up their radio and give the apartment house, or area, in which you live the benefit of their chosen program, pause a moment before you make the statement, "How can they stand it so loud!"—or something worse.

Maybe the neighbors are among those individuals who differ greatly from you in their sensitivity to sound and in their judgment of sound intensity. What you may consider, and perhaps rightly, a very loud sound may to them be merely a pleasing loudness.

New findings by scientists at the Bell Telephone Laboratories show that people have a sound intensity threshold, or lower limit of hearing sensitivity, which may vary as much as one-fifth of the total auditory range. Technically the threshold range for a 1,000 cycle note amounts to a spread of 25 decibels.

Still more widely varied is the individual judgment of loudness of a sound, it was found. From test observations on people who had no prior experience in acoustics or sound measurements, J. C. Steinberg and W. A. Munson found that the variation might be as great as one-third the whole audible range. For scientists it can be explained that the range on a 1,000 cycle test note was 45 to 50 decibels.

In their report (*Journal, Acoustical Society of America*, October), the scientists describe the experimental equipment employed to make possible the comparison of sounds as to their loudness and the efforts made to allow the use of observations coming from a group of 100 test subjects of varying ages.

Science News Letter, October 17, 1936

CONSERVATION

All Shooting Barred On Canvasback and Redheads

CANVASBACK and redhead ducks, prized by sportsmen and gourmets alike, are now on the Government's "fully protected" list. Shooting of these species is barred at all times, and the U. S. Biological Survey is making a strong effort to see that the new regulation is effectively enforced.

This step has been made necessary, explained Ira N. Gabrielson, chief of the Biological Survey, by the havoc wrought in the birds' breeding grounds, first by drainage and breaking up of the land for cultivation, and during the past few years by the added intensive effects of drought.

The principal breeding ranges of both species are from north central Nebraska up into the Canadian prairie provinces, and over a wide area extending from interior British Columbia southward and westward to the California coast.

Many of the ducks from the first of these two regions fly across country to winter feeding grounds along the eastern coast of the United States. Hunters who have seen the vast "rafts" of canvasback on the Susquehanna Flats of Maryland have wondered why shooting should be stopped, in the face of such an apparent abundance of birds. Mr. Gabrielson explains that the 200,000 ducks shown on the Susquehanna Flats census represent a heavy percentage of all the canvasbacks and redheads left in the world, and that if sportsmen want any of them to shoot in future years it will be necessary to save them now.

Science News Letter, October 17, 1936

INVENTION

Horses This Winter May Have Rubber Overshoes

NON-SKID horseshoes are now being perfected, to give horses a firmer grip on slick pavements in bad weather. Latest models are of drop forged steel, rubber covered, and have the added advantage of giving the horses far more quiet tread than old-style footwear.

Science News Letter, October 17, 1936

SEE FIELDS

PALEONTOLOGY

120,000,000-Year-Old Fish Found in a Rock in Texas

A FOSSIL deep-water perch, first of its kind to be found in North America, has been received by the museum of paleontology of the University of California. The specimen was found near the town of McKinney, Texas, by W. W. Pruett. It was in the center of a limestone rock dug from under the foundation of an old monument. Breaking of the rock revealed the specimen.

The appearance of the specimen is similar to that of the present-day perch, except that it was a marine fish living in deep waters. It was about six inches in length, and was a swift swimmer. Living relatives can be found today off the coast of Europe.

The specimen, which belongs to the Cretaceous geologic period of about 120,000,000 years ago, helps to complete the picture of marine life as it then existed off the coast of this continent, according to C. J. Hesse, research assistant in the museum.

Fossil fish of the same geologic epoch have been found in abundance in western Kansas, Mr. Hesse said. But they are mostly near-shore fish. The present discovery is one of the few deep-water fish of the period to be found in North America.

Science News Letter, October 17, 1936

RADIO

Radio Tube Amplifies In Television Range

A NEW and powerful radio tube for use in the high frequency regions that television and other new radio services will utilize was revealed to the Institute of Radio Engineers at their meeting in New York City, by A. L. Samuel and N. E. Sowers of the Bell Telephone Laboratories.

The new tube is a push-pull power pentode. Through its use it will be possible for radio engineers to construct stable amplifiers at ultra-high frequencies having gains of 12 to 25 decibels per stage of amplification and delivering

several watts of power. Its stability and distortion in the extreme short wave region of 80 to 300 megacycles compare favorably with the performance of conventional tubes at much lower frequencies.

Unusual construction features include the mounting of two pentodes in the same envelope with inter-connected screen and suppressor grids, complete shielding between the input and output circuits with no common leads, and provision for cooling all grids while maintaining extremely small spacings between the electrodes. The electrical characteristics depart from the conventional mainly in the low value of lead inductances and the high value of the grid input resistance at ultra-high frequencies.

Science News Letter, October 17, 1936

GENETICS

April to July for Birth Of Male Babies

IF IT'S a boy you want, Fond Parents, plan his birth date for some time between April and July.

American birth statistics support the view that conception occurring from July to September is "favorable to increased masculinity," according to *The Journal of the American Medical Association* (October 10).

English investigators find that rural areas produce more boy babies than do the cities, and from statistics available in the United States the same seems to be true here.

Social upheavals seem to bring more boy babies. During the World War and immediately thereafter, the ratio of male births increased in the war countries. Neutral nations experienced the same phenomenon but not to such an appreciable degree.

In England and Wales the upper classes give birth to more boys in proportion than do the lower classes.

In Greece the masculinity of births is exceptionally high. In Japan and Italy it is low.

W. T. Russell, the investigator quoted by the medical journal, finds no conclusive evidence that the sex ratio is related to the age of the parents, but any relationship that may exist is with the age of the father rather than with the age of the mother.

"The biologic fact of the preponderance of male births in the human race is an established one," says the medical journal, "but its purpose is still a matter of debate."

Science News Letter, October 17, 1936

VITAL STATISTICS

Longer Life for Workers Gained by Health Efforts

LONGER life for the working classes in this country has been gained during the past quarter of a century as a result of public health activities, a report of the Metropolitan Life Insurance Company shows.

The expectation of life at birth for the industrial policyholders of this company crossed the 60-year mark for the first time in 1935. In 1911 the expectation of life at birth for this class of the population was only 46.63 years whereas now it is 60.25 years.

Expectation of life at birth for the working classes is now almost as good as for the population as a whole, it appears from comparison of the life insurance figures with those of the United States Registration Area. For the whole population, in 1934, life expectation at birth was 60.79 years.

The gain in life expectation of the insured wage earners appears even more striking when compared with urban dwellers rather than with the population as a whole. This is a fairer comparison, the life insurance statisticians point out, because the insured wage earners live chiefly in cities. White males of age 10 in the urban area of the United States gained 3.95 years of life from 1910 to 1930, while white male industrial policyholders at the same age gained 6.77 years from 1911-12 to 1930. At the same age white females in the industrial policyholder group gained a year more than those in the urban area of the United States.

The gain in life expectation for the industrial class is all the more striking and encouraging because it was made during a quarter century that included the World War, the devastating 1918-19 influenza epidemic and the economic depression, each of which greatly affected the lives and health of the population. Commenting on this, the life insurance officers compliment the health authorities of the country as follows:

"Throughout this quarter century, and in the face of the calamities mentioned, those charged with the administration of our public health activities have maintained a scientific attitude toward their duties. Current discoveries in medicine and sanitary science have been applied as soon as they had demonstrated their worth. The results are undoubtedly reflected in the highly gratifying figures that have been quoted."

Science News Letter, October 17, 1936

PSYCHOLOGY

New Words for Campaigners

Psychologists Studying Personality List Some 18,000 Terms That May Be Used To Describe Another Person

By MARJORIE VAN DE WATER

RECKLESS, unctuous, cold-blooded, starry-eyed, greedy! Wanton, arrogant! Waster! Spoiler! Shameful, fantastic, grotesque! Cruel, capricious, hysterical! Befogged, confused, irresponsible! Calculating, ambitious! Prestidigitator! Incompetent, demoralizing, alien!

These are only a few of the epithets that are being hurled in the present political campaign. Daily and nightly stump speakers are dealing out invective from radio, stage and soap box. Did you ever think they might run out of words? One wonders, is there no limit to the names that one candidate may call another—names of abuse for the opposition nominee and flowery tribute for the candidate of the right party? How many such words are there in the whole English language?

Psychologists have given us the timely answer to this question in a new scientific study which should prove a veritable boon to political speakers. It lists no less than 17,953 terms that one candidate for office might call another without once repeating himself.

This volume was not prepared by either the Republican or the Democratic National Committee. It is entirely non-partisan. Its usefulness is not even confined to the political platform; you might refer to it yourself to freshen up your vocabulary the next time your neighbor fails to return your lawnmower or wants you to send back his umbrella.

For Personality Study

The psychologists, Dr. Gordon W. Allport of Harvard University and Dr. Henry S. Odber of Dartmouth College, were not primarily interested in rendering first aid to those whose blistering vocabularies were turning cold. They wanted to clarify the nomenclature used in the scientific study of human personality. So they set about trying to find out just how many words in the English language are used to describe some phase or other of character or human nature. This volume is the amazing result.

Maybe some of these thousands of terms overlap a bit in meaning here and

there. Some have become rare or obsolete with the passage of time. Others are as new as next year's automobile. But altogether these scientists found that their list had run to a total of nearly 18,000 terms. And at that they included only a few slang terms—those which come the nearest to being accepted words.

These terms are by no means all words of abuse, but it is in the invention of such terms that man has shown his greatest talent as a maker of language. And plenty of words of abuse have been retained in the language to find place on this new list. Let's just start with the A's, for example.

Abnormal, absurd, accursed, addle-brained, abysmal, abrasive, acrid, aimless, ambiguous, alcoholic, aping, anti-social, appalling, arid, arrant, asinine, anarchistic, apish, apathetic, applause-seeking, afterwitted, abandoned, alarmist, aldermanic, amatory, arrogant, attitudinizing, atheist, autocratic, avaricious, atrocious, audacious, average, and awful.

A to Z

The list, of course, covers the whole range of the alphabet. Beginning with "abandoned," a word with which everyone is familiar, it ends with less well known words such as "zetetic," which is complimentary, and "zebrine," which is not.

Words which liken a person to an animal contribute a large share to the list. Most of these are uncomplimentary, but there are exceptions such as "thoroughbred," and perhaps even "foxy" and "bird" need not be derogatory.

Of course you know and could hardly do without these words: asinine, bull-headed, catty, and cur. But are these in your everyday vocabulary: harebrained, beef-witted, mutton-headed, pigeon-hearted, poll-parrot, and even worm? The complete list would be much too long, but here are a few more: bellwether, bird, boarish, bug, bulldog, buzzard, calf, canine, cat, chicken, chicken-hearted, clam, clammy, cod, colt, cuckoo, dog, duck, fish, hen-hearted, hogfish, leech, one-horse, pet, polecat, and rat.

Perhaps such terms as "egg," and "fossil" might come into this classifica-

tion, too, but that is a little far fetched.

The plant world has also contributed its share of colorful adjectives and nouns to dress up the comments of one person about another. Here are a few: hayseed; cabbage-head, nut and nutty, sap, sap-headed, and sappy; seeded and seedy; lemon; pansy; peach and peachy; gillyflower; and gooseberry.

The earth itself has lent itself to analogous terms of varying meanings. One person may be described as "dry-as-dust," and another as "clay-cold" or a "clod-hopper." Then there are clay-brained, clod, clod-pate, and clod-poll.

Here are more inspired by nature: Breezy, fresh-water, mountainous, thunderous, thunderless, and torrential.

Personality Colors

Did you ever happen to think how many terms for humans are derived from colors? You may speak of a girl as "colorful" or a man as "off-color."

The untrained worker is a "greenhorn," but if he is fired he may become "blacklisted," especially if he is mixed up with a "blackguardly," "black-mouthed," "red" agitator. But if he shows the "white feather" his comrades may call him "yellow."

Although the girl friend may be "true-blue," if she shows interest in a rival, her lover may become "green-eyed" and yet at the same time "blue." In spite of the fact that she is "fair" she may have a "dull" sister and a "grimy" brother. And, if she is "green" enough, she may run off with a "black-leg."

It seems odd that tastes should provide terms for human personality, yet a few such are included in the list. Briny, candied, greasy, and palatable are examples.

Kitchen and cookery give us a rich list. Perhaps it is there that heated words fly and so new terms are most often originated. Suppose the cook were describing the folks she knows.

Maybe the woman she works for is "milk-livered," but her husband is "hard-boiled." Still she has a young son who is "half-baked" and "milk-soppy." The mother-in-law is "peppery," and the young daughter of the family is a "prune." There is a "pudding-headed" sister, and a "milk-and-water" brother, an uncle who is "unsavory," and a

father who is a "pickle." This by no means exhausts the possibilities.

We may describe a person in terms of our sensations. A lady is spoken of as "cold," a friend as "warm." A boss may be "hard," or an employe "soft." An entertainer may turn out to be "wet." And so it goes.

From the Body

The body itself provides some vivid descriptive terms. Everyone knows what is meant when a man is referred to as "just a heel." Here are some others that may not be quite so familiar: bloodless, brainless, dry-bones, fist, high-hearted, high-stomached, brainsick.

Early medicine, with its theories of the "humors" of the body, brought with it terms, then scientific, now an integral part of the common speech and indispensable in daily use. The word "humorous" itself has this origin although its meaning has greatly changed during the passing of the years. Then there are "good-humored" and "bad-humored," which have clung more closely to their original significance. Here are some more: sanguine, phlegmatic, choleric, melancholy, hearty, heartless, cordial, hypochondriacal with its modern abbreviation "hipped," temperament, cold-blooded.

And that leads us to astrology and the ancient idea that the heavenly bodies influenced those born while they were in the ascendency. So we have these words: lunatic, jovial, saturnine, mercurial, martial, and ill-starred.

Modern science, and especially, of course, psychology, has contributed a generous share of terms in recent years. In this group are such words as these: anthropoid, prophylactic, atavistic, introverted, extroverted, neurotic, regressive, psychasthenic, eidetic, cyclothymic, schizoid, psychoneurotic, psychopathic, and so on.

Religion has been generous in contributing to the list of available terms to apply to our neighbors.

What term is more universally useful and more expressive than the word "dunce"? That was first hurled at another person during the heated arguments of the days of the Protestant reformation and is derived from the name of Duns Scotus, great British medieval philosopher. Those days also brought us such excellent words as "malignant," "pernicious," "bigoted," and "fanatic." They have also bequeathed us the more complimentary terms: "pious," "sincere," and "precise."

Scorn for Country

The feeling of superiority shared by all city-dwellers at the expense of their country cousins is reflected by the number of derogatory or semi-derogatory terms connected with the country and parallel complimentary terms derived from words for city.

Bumpkin, rustic, countrified, boorish, boor, churl, churlish, villain, clodhopper, bog-trotter, hayseed, yokel, rube! Those are a few of the country-derived words. On the other side of the

picture are such smooth words as urbane and metropolitan.

But to return to the field of politics and war, here is a rich opportunity for the coining of new and vivid terms for other humans. Red-blooded words they are too, and full of meaning; fighting words, words to make the heart beat faster and the fists fly.

Crusades Contributed

From the days of the Crusades we have inherited the punch-loaded words, assassin and miscreant. The former of these originally meant merely hashish-eaters, but another and richer meaning was read into it by the soldiers of that day, and with this richer meaning it has become a permanent part of the English language. Miscreant, similarly, had an original meaning of misbeliever, but today it is retained with a meaning more like mis-behaver.

In our own day we have learned new words or new meanings for old ones. We have "chiseler," "braintruster," and "boondoggler."

Campaigns of bygone years gave us pussycat, mollycoddle, mugwump, carpetbagger, muckraker, dry, pacifist, scofflaw, snooper, palm-greaser, propagandist.

The Great War and the recent "red-baiting" have given us slacker, hyphenate, Hun, Boche, red, Bolshevik and Bolshevik.

But all these are but a few of the possible classifications for this strange dictionary of human appraisal. The authors

(Turn to next page)



HONORS GEOLOGIST

On the campus of Oklahoma State Teachers' College the memory of the late Dr. David White, noted scientist of the U. S. Geological Survey and trustee of Science Service, is preserved in this giant petrified tree stump.

GEOLOGY

350,000,000-Year-Old Monument to Geologist

AN EMINENT American geologist, the late Dr. David White, has been given a most fitting memorial monument on the campus of the State Teachers' College at Ada, Okla. It is the base of a petrified trunk of one of the oldest trees in the world, known to scientists as *Callixylon*, dating back to Devonian time, 350,000,000 years ago.

When the petrified tree was found, about 20 miles from Ada, John Fitts, a friend and admirer of Dr. White, arranged to have the mass of stone moved and set up on the campus.

Before his death in 1935, Dr. White was principal geologist of the U. S. Geological Survey, curator of paleobotany of the U. S. National Museum, and a trustee of Science Service.

themselves have undertaken a classification of their own which is more useful for the scientific purpose for which the list was originally designed.

Four and a Half Per Cent

In the first place, they needed to decide what should go into the list and what should be discarded from it. Included are all of the words descriptive of personality or personal behavior, except those that are obsolete, that are included in Webster's New International Dictionary. Altogether 400,000 words were combed through to secure the list, and 17,953 were selected—4½ per cent of the total English vocabulary.

The adjective form of a word was used, and other forms discarded from the list, except when different forms of the word have different meanings as in the case of "sour" and "soured." A person is "sour" because of his natural disposition, but he is "soured" because of his experiences in life. Both these forms are retained.

A few slang terms are included.

Words were included only if they served to distinguish one human being from another. Such terms as "walking" or "digesting" were discarded on this ground while terms like "mincing" or "dyspeptic" were included.

When the list was assembled, and the unsuitable words discarded, the remaining 18,000 were divided into four groups which are printed in four parallel columns.

The first column, containing about 25 per cent of the total words, contains the words which stand most clearly for the real traits of personality. In this column are such words as "aggressive, introverted, and sociable." These are not just terms of abuse or praise, they really describe the nature of man.

In the second column are terms descriptive of present, or momentary, activity or mood. Here are such words as "ashamed, rejoicing, frantic."

Character Evaluations

In column three are the evaluations of character. It is this column that should prove the particular boon to stump speakers. Here are words like "dazzling," "irritating," "insignificant," "acceptable," "worthy." This column starts out with "abnormal, absorbing, absurd, accursed, addle-brained." It ends with "yegg, yellow, yellowish, yokel, youngling, youthful, zany, and zeating." This column is the longest of the four. In this list of abuse and commendation are 5,226 terms, or 29 per cent of the total list.

Column four contains those words which can be classified best under the term "miscellaneous." Here are the words which are the despair of editors and classifiers, words which apply to human character because of their metaphorical nature or because of meanings read into them during the course of time. Here are such terms as "red-headed, hoarse, malformed, pampered."

Column four begins with such terms as "abortive, abrasive, absolute, abysmal,

Achillean." It ends with "yeasty, young-eyed, zebrane, zooid, and zoophilous."

Together the four columns should serve a great many serious and trivial purposes and may one day take a place along with the dictionary and the thesaurus on the desk of those who wish a mastery of words.

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Science News Letter, October 17, 1936

PHYSIOLOGY-PsYCHOLOGY

Freezing Affects Mind First; Initiative and Modesty Lost

AN EXPERIMENT in which a noted physiologist, Sir Joseph Barcroft of Cambridge University, England, deliberately froze himself nearly to death, was reported by Sir Joseph in a lecture at Yale University.

The mind was first to suffer in the freezing process, as shown by loss of initiative and of a natural sense of modesty, Sir Joseph reported. He cautioned against taking such liberties with the mind.

The experiment was part of a study to learn how the human mind is affected by changes in the internal environment of the body. In other similar experiments, Sir Joseph stayed in a room filled with deadly hydrocyanic acid gas until a dog with him died, and later stayed for twenty minutes in a room containing 7.2 per cent of carbon dioxide gas.

Man's intellectual development and motility, Sir Joseph pointed out in his lecture, depend on the temperature and other factors of his internal environment remaining constant. As little as one degree of fever affects the mental processes.

"In each of the two experiments which I performed there was a moment when my whole mental outlook altered," Sir Joseph said in describing his feelings during near-freezing.

"As I lay naked in the cold room I had been shivering and my limbs had been flexed in a sort of effort to huddle up, and I had been very conscious of the cold. Then a moment came when I stretched out my legs; the sense of coldness passed away, and it was succeeded by a beautiful feeling of warmth; the word 'bask' most fitly describes my condition: I was basking in the cold.

"Up to the point at which shivering ceased, nature fought the situation; my

instinct was to be up and about, an effort of will was necessary to remain the subject of the experiment; after that point I gladly acquiesced, initiative had gone. Doubtless a second and more advanced stage would follow in which inertia would lapse into unconsciousness. For I suppose that, had the experiment not ended at that point, my temperature would have fallen rapidly and I was on the verge of the condition of travelers when they go to sleep in extreme cold never again to awake.

"And I was conscious of other reverberations of mental state: not only was there a physical extension of the limbs, but with it came a change in the general mental attitude. The natural apprehension lest some person alien to the experiment should enter the room and find me quite unclad disappeared."

Sir Joseph concluded from his various experiments on himself that the most immediate effect of interference with the chemical or physical properties of the blood is impairment of the higher qualities of the mind.

"The thoughts of the human mind," he said, "its power to solve differential equations, or to appreciate exquisite music, involve some physical or chemical pattern, which would be blurred in a milieu itself undergoing violent disturbances."

Science News Letter, October 17, 1936

Although the wild bean known as St. Ignatius bean, in Philippine forests, contains strychnine, it has so far found only slight use in commerce.

Studying the life histories of single rainstorms, scientists have discovered that rainfall in a storm varies from spot to spot much more than was suspected.

INDUSTRIAL HYGIENE

Tuberculosis Most Important Disease Problem in Industry

Preventing Illness and Injury Industrial Physician's Chief Job; Most Occupational Diseases Preventable

TUBERCULOSIS is the most important disease problem in all industry, from the standpoint of both workers and employers. This assessment of the tuberculosis problem was made by Dr. B. L. Vosburgh of the General Electric Company, Schenectady, N. Y., at the meeting of the American Association of Industrial Physicians and Surgeons.

In spite of enormous strides made in the control of tuberculosis it is still a serious disease, Dr. Vosburgh explained, because it continues to take a heavy toll particularly in the age groups from 20 to 40 when man's productivity is at its peak.

"From both an economic and a public health standpoint it outranks every other contagious disease with the possible exception of syphilis," he said.

The bright side of the picture appeared when Dr. Vosburgh told how the worker who has contracted tuberculosis can be protected from the most disastrous effects of the disease and can be kept in good enough health to go on working at his job.

Watch for It

The important thing is to discover the disease before it has progressed far enough to do irreparable damage. For this Dr. Vosburgh recommended regular examinations and supervision of all industrial workers. By such methods many cases of tuberculosis will be discovered even when the patient does not know he is sick. These are the cases in which the disease may have partially healed spontaneously, but there is always danger of its breaking out in severe form if the worker becomes over-tired or works in a dusty atmosphere.

Illustrating this point, Dr. Vosburgh reported the case of a young millwright who pulled with all his might on a rope and then began to have bloody sputum. After five years of compensation, he died at the age of 44. This man had been working with a partially healed tuberculosis for years, Dr. Vosburgh said.

For both the worker whose tuberculosis has healed spontaneously, as discovered by examination, and the worker

who has been discharged from a sanatorium with an arrested case of tuberculosis, the paramount thing is to find the proper job. The job that will be easiest is the one such a worker should have. Usually this means the job the man knows most about.

The worker with arrested tb should not be put back at his own job, however, when the work itself was a factor in lighting up the disease in the first place, or when the work is of a kind to strain or tire the worker, or if it is a dusty job.

Keeps Workers Healthy

Preventing illness and injury among the workers is now the chief job of the industrial physician, Dr. C. D. Shelby, medical consultant for the General Motors Corporation, Detroit, declared.

It is a far cry from the old days when the plant doctor's chief and only job was to give first aid and emergency treatment of injuries incurred by the workers. Now he goes out into the plant with the engineers and looks for conditions which might cause injury or sickness, so that these conditions may be changed and the injuries and illnesses prevented.

Another important function of the industrial physician as described by Dr. Shelby is the examination of applicants for employment and recommendation for their placement at work of a type for which they are best suited from a health standpoint. The workers employed should be examined regularly and often, to discover the first signs of disease, whether connected with the job or not. Except in emergencies or accidents, the modern plant doctor does not treat the employees, but watches over their health, referring them to their own physicians for whatever medical treatment they may need.

Engineer Prevents Illness

Most cases of industrial or occupational diseases can be prevented by the engineer, Reuel C. Stratton, supervising chemical engineer for the Travelers Insurance Company, Hartford, Conn., declared.

Diseases caused by dust, such as

silicosis, should not take all the engineer's attention, Mr. Stratton warned. At present, safety engineers and industrial hygienists are concentrating upon these dusty diseases, but Mr. Stratton cautioned the engineer against letting attention to these diseases keep him from noticing and preventing other health hazards in industry.

This job of prevention which Mr. Stratton put up to the engineers, however, is enormous and most confusing and perplexing. As an aid in attacking the job, Mr. Stratton suggested a three-point program.

First the engineer should make an inventory of occupational diseases that may occur in his plant. For this and for many other features of his job he needs the cooperation and aid of the plant physician.

Second point is to draw up a plan for correction of the exposure shown by the inventory.

Third point is to make a concentrated attack on the major exposures first, following through until all are eliminated.

An important feature of industrial hazards is the length of time the worker is exposed to the particular hazard. For assessing this factor, and for determining which workers are least susceptible to injury from a particular process, the engineer needs the aid of the physician.

Constant introduction of new materials and methods in industry makes the engineer's problem more difficult. Often he cannot find any previous knowledge of possible health hazards in the new substances. Laboratory work to determine the effects of new chemicals on the human body is proceeding, but slowly, Mr. Stratton said.

Science News Letter, October 17, 1936

Ten per cent of the people in the United States die of cancer.

PSYCHOLOGY OF SEX

by HAYELOCK ELLIS

CARL VAN DOREN says:

"The best one-volume treatment of sex in the English language"

"...the best of all available books on this subject."

—HYGEIA

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VITAL STATISTICS

**Birth Rate Declining
In United States**

THE BIRTH rate in the United States continues downward, latest figures analyzed by statisticians of the Metropolitan Life Insurance Company show. The 1935 birth rate of 16.8 births per thousand population almost reached the all time low of 16.6 recorded in 1933.

The slight rise in 1934 encouraged the hope that the long downward trend and the threat of an ultimately declining population might be averted. The latest figures show, the statisticians point out, that the 1934 rise was only a temporary deviation from the general downward trend of the birth rate.

Each of 33 states and the District of Columbia, representing over half the country's population, showed a falling birth rate. Nine states which showed increases in 1935 were: Illinois, Michigan, Wisconsin, Arizona, Colorado, Montana, California, Florida and Mississippi. These states make up 21 per cent of the population of the country.

Canada's birth rate is declining even more markedly but this nation can better afford the decline as she has a somewhat higher birth rate than the United States. The Canadian birth rate for 1935 was 20.2 per thousand.

Science News Letter, October 17, 1936

RADIO

October 20, 5:15 p.m., E.S.T.

SCIENCE AND HOUSE PLANTS—W. R. Beattie, Senior Horticulturist, U. S. Bureau of Plant Industry.

October 27, 4:00 p.m., E.S.T.

POWER FROM THE SUN—Dr. Charles G. Abbot, Secretary of the Smithsonian Institution.

In the Science Service series of radio discussions led by Watson Davis, Director, over the Columbia Broadcasting System.

This Handy Coupon

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**The Economy of Leaves**

LEAVES falling from autumnal trees, littering lawn and forest floor, offer just about as good an example in what might be called the engineering of nature as can be found in a lifetime's searching. Yet because it goes on all around us every day, most of us just take it for granted and so disregard it.

But consider the phenomenon for a moment. All summer long, the leaves have been functioning as the prime food-forming organs of the tree. To give a broad spread for the sunlight-catching chlorophyll, they are mostly wide and flat. The nature of the food-making process demands that they be thoroughly moist throughout.

But when winter comes, these qualities that are assets in summer would be heavy liabilities. If left to face the high winds and freezing temperatures, the heavy investment in protoplasm and foodstuffs they represent would be lost—killed by the frost and torn off in tatters by the gales. Only the needle-leaved trees, the conifers, are able to

face winter in full foliage, and even they are sometimes severely penalized by overloads of wet snow or clinging glaze-ice. But the broad-leaved trees, having shed their leaves, can stand close-reefed.

Before the leaves are shed, however, a great deal has to be done. They are not simply snapped off and cast adrift, with all that useful capital of food and living cell-contents still in them. When the days shorten and the nights begin to hint of coming frost, the leaves slow down operations. They export the food-substances back into limbs and trunk faster than they form it. Finally even the protoplasm and its chlorophyll break down and are withdrawn into the parts of the tree that will survive the winter. Like a good factory manager curtailing operations and abandoning part of his plant in the face of a business depression, the tree salvages all that can be saved and used, before abandoning its leaves.

Colors Unmasked

It is during this withdrawal process that the leaves assume their gorgeous fall colorings. These have been in part there all the time, but have been masked by the stronger summer green. In part, however, they represent the breakdown products of the chemical death of the chlorophyll.

Finally, after everything salvageable has been taken out and stored in the limbs and trunk, a double layer of cork cells forms directly across the leaf-stem, sealing each tiny leaf-scar on the twig against the entry of fungi and other disease organisms when the leaves break off and drop away.

And even on the ground, the leaves still have their uses. They mulch small plants against the snow and ice, and in due time are reduced to the earth from whence they came—to be taken up by roots and woven into a new cycle of leaves.

Science News Letter, October 17, 1936

PUBLIC HEALTH

**Defective Hearing Aided
By New State Law**

A NEW LAW in New York requires that all children under six years with defective hearing must be reported to the State Commissioner of Health. Welfare agencies can then aid the child with education and medical care if the family is not able to provide adequate treatment.

Science News Letter, October 17, 1936

'First Glances at New Books

**Additional Reviews
On Page 256**

Horticulture

ADVENTURES WITH HARDY BULBS—Louise Beebe Wilder—*Macmillan*, 363 p., plates, \$5. Autumn is the time for planting most hardy bulbs, so that Mrs. Wilder's book comes to market just when it should come. To borrow a figure from a more plebeian bulb, the author "knows her onions": she shows an encyclopedic knowledge of the horticultural botany of the bulb ornamentals, and to this she adds the practical earthy ecology of an experienced gardener.

Science News Letter, October 17, 1936

Psychology

THE DREAM IN PRIMITIVE CULTURES—Jackson Steward Lincoln and C. G. Seligman—*Williams and Wilkins*, 359 p., \$4. Freudian theory is applied to dreams in various Indian tribes. Anthropologists who accept Freudian teachings will find it highly interesting to follow these theories into the lives of people to whom dreams are such powerful forces for shaping thought. Anti-Freudian readers will be more concerned with seeing how psychology can be used intensively to interpret anthropological data.

Science News Letter, October 17, 1936

Petrology

INTERPRETATIVE PETROLOGY OF THE IGNEOUS ROCKS—Harold Lattimore Alling—*McGraw-Hill*, 353 p., \$3. Not attempting to cover the whole field of petrology, the author has the more space available to make thorough and complete the part he does undertake. The explanatory diagrams are especially useful, giving in a single glance the essence of many pages of text.

Science News Letter, October 17, 1936

Science

PROCEEDINGS OF THE SECOND DEARBORN CONFERENCE OF AGRICULTURE, INDUSTRY AND SCIENCE, DEARBORN, MICHIGAN, MAY 12, 13 AND 14, 1936—Farm Chemurgic Council and The Chemical Foundation, Inc., 409 p., 50c.

Science News Letter, October 17, 1936

Anthropology

YALE UNIVERSITY PUBLICATIONS IN ANTHROPOLOGY, NOS. 8 TO 13—Richard C. Thurnwald, William N. Fenton, C. F. Vogelin, William Morgan, Helen H. Roberts and George Peter Murdock—*Yale Univ. Press*, 163 p., \$2.50. Aside from Mr. Thurnwald's

paper on the profane literature of a Solomon Island tribe, this collection deals with Indian studies. The material includes such topics as the female creator deity of the Shawnee Indians, human-wolves among the Navajo, the differences in music sung and played by Indians in various regions of North America.

Science News Letter, October 17, 1936

Science

THE ADVANCEMENT OF SCIENCE: 1936—British Association for the Advancement of Science—*British Association, London*, 248 p., 3s. 6d. The annual assay of science's progress, which is conducted during the annual meeting of the British Association, is here made available through the publishing of addresses given before the recent Blackpool meeting.

Science News Letter, October 17, 1936

Anthropology

EGYPTIAN STELAE IN FIELD MUSEUM OF NATURAL HISTORY—Thomas George Allen—*Field Museum of Natural History*, 79 p., 43 plates, \$1.50. The Egyptian texts, translation, and photographs of the monuments are presented. The stones thus described served as false doors in tombs, or the tombstones which became evolutionary successors to the false door idea. They date from eleventh dynasty on to the Coptic era.

Science News Letter, October 17, 1936

Mathematics

DIAGRAMS IN THREE DIMENSIONS—E. R. Breslich—*Orthovis Co.*, 15 figures, with ortho-scope for viewing, \$2. By means of dual red and green drawing plus the familiar colored spectacles the three dimensional objects of solid geometry take on a new meaning which should help the student learn the subject with greater facility.

Science News Letter, October 17, 1936

Archaeology

EXCAVATION OF THE NOWLIN MOUND—Glenn A. Black. NOTES ON THE POTTERY—James B. Griffin and Frederick R. Matson, Jr.—*Indiana Historical Bureau*, 104 p., 69 plates, 25c. The process of examining contents of a well-known burial mound in Indiana is described. The mound is identified as the work of Indians whose manner of living resembled the Adena type of Mound Builder culture.

Science News Letter, October 17, 1936

Astronomy

CONSTELLATIONS—Franklin Institute Dept. of Astronomy, under direction of James Stokley—*Franklin Institute*, 32 p., 35c. Star maps for a year, as they have appeared with Mr. Stokley's articles in the SCIENCE NEWS LETTER, together with concise but thoroughly adequate text descriptions, make this booklet a highly desirable addition to the field library of anyone who aspires to become better acquainted with the stars.

Science News Letter, October 17, 1936

Horticulture

SPRING FLOWERS FROM BULBS—Claire Norton—*Doubleday, Doran*, 94 p., \$1. Next spring's glory will spring largely from bulbs put into the earth during the present few fall weeks. This book, brief, practical, adequately illustrated, is therefore very timely.

Science News Letter, October 17, 1936

Biology

GENERAL BIOLOGY —James W. Mavor—*Macmillan*, 729 p., \$4. A full text for the beginning college course by the professor of biology at Union College.

Science News Letter, October 17, 1936

Chemistry

GENERAL CHEMISTRY—Harry N. Holmes—*Macmillan*, 700 p., \$3.50. Third edition of the popular text by Oberlin College's professor of chemistry.

Science News Letter, October 17, 1936

Science Teaching

THE HIGH SCHOOL SCIENCE TEACHER AND HIS WORK—Carleton E. Preston—*McGraw-Hill*, 272 p., \$2. For teachers and students of schools of education, written by the associate professor of the teaching of science at the University of North Carolina.

Science News Letter, October 17, 1936

Anthropology

MITLA, TOWN OF THE SOULS, AND OTHER ZAPOTECO-SPEAKING PUEBLOS OF OAXACA, MEXICO—Elsie Clews Parsons—*Univ. of Chicago Press*, 590 p., \$4. Indian or Spanish? To sort out these two elements that blend so perplexingly in Mexican customs today, Dr. Parsons has studied the life of a most interesting town, Mitla. The result is no technically worded report, but a lively account of her observations, written with Dr. Parsons' usual literary skill.

Science News Letter, October 17, 1936

*First Glances at New Books

Additional Reviews
On Page 255

Medicine

AN AMERICAN DOCTOR'S ODYSSEY—Victor Heiser—*Norton*, 544 p., \$3.50. The tale of Dr. Heiser's travels and experiences as officer of the U. S. Public Health Service and later as "drummer of ideas" for the Rockefeller Foundation's International Health Board makes a fascinating book. Dr. Heiser has modestly kept himself in the background, but his enthusiasm for the work he carried forward for so many years reaches through the pages of the book and carries the reader along with him over the adventurous years of life saving and health promoting.

Science News Letter, October 17, 1936

Science and Invention

THE NEW CHAMPLIN CYCLOPEDIA FOR YOUNG FOLKS, SCIENCE AND INVENTION—Vols. I and II—George Moreby Acklom, Ed.—*Henry Holt*, 1001 p., \$5.00 each volume. Profusely illustrated books packed with 15,708 articles so written that high school students can understand them, discussing the fundamental terms and principles of science and their applications through the inventive arts.

Science News Letter, October 17, 1936

Agriculture—History

THE SOCIAL HISTORY OF AMERICAN AGRICULTURE—Joseph Schafer—*Macmillan*, 302 p., \$2.50. At the present moment, when vast changes in the American and world social set-up hinge so largely on agrarian adjustments, there cannot be too much of thoughtful examination of our farm-life picture. Dr. Schafer, who is superintendent of the State Historical Society of Wisconsin, one of the greatest of our farming communities, has had peculiarly advantageous opportunities to observe, and here shows correspondingly good ability in understanding and reporting.

Science News Letter, October 17, 1936

Forestry—Manufacture

FROM FOREST TO FURNITURE, THE ROMANCE OF WOOD—Malcolm H. Sherwood—*Norton*, 284 p., \$3. The author, who has spent a lifetime learning about wood, working with wood, and telling others about wood, here tells us, with a charming interweaving of solid fact with lively personal anecdote, a great deal about wood as it is used in furniture. His experience and learning range from the strong dependable

woods of home, like oak, gum, and black walnut, to such lovely exotics as satinwood, zebra-wood, and amboyna. There are pictures of striking trees and of beautiful furniture.

Science News Letter, October 17, 1936

Hygiene

DIGESTION AND HEALTH—Walter B. Cannon—*Norton*, 160 p., \$2. The distinguished professor of physiology at Harvard Medical School has summarized for the layman in a few easily read chapters the wealth of scientific knowledge about digestion. The volume is a modified version of the Beaumont Lectures, given at the centennial celebration of the publication of Beaumont's famous book on digestion.

Science News Letter, October 17, 1936

Natural History

MOUNTAIN NEIGHBORS—Edith M. Patch and Carroll Lane Fenton—*Macmillan*, 156 p., \$1.50. The author-artist team that have produced this book have already demonstrated their abilities in the field of natural history, both independently and in collaboration. Dr. Fenton's present contribution consists in the drawings only, but his recognized status as a competent field scientist supplies solid backing for his artistic efforts. If you give a Patch-Fenton book to one of the youngsters (or keep it for yourself) you can't go wrong.

Science News Letter, October 17, 1936

Paleobotany

STARUNIA: NO. 10. Pleistocene Flora von Sciejowice bei Krakau—Józef Małdalski—*Polish Academy of Sciences*, 12 p.

Science News Letter, October 17, 1936

Psychology

FUNDAMENTALS OF PSYCHOLOGY IN SECONDARY EDUCATION—S. C. and K. C. Garrison—*Prentice-Hall*, 599 p., \$2.80. A new textbook by the dean of George Peabody College's Graduate School of Education and the professor of psychology of the North Carolina State College of the University of North Carolina.

Science News Letter, October 17, 1936

Physics

THE RENAISSANCE OF PHYSICS—Karl K. Darrow—*Macmillan*, 306 p., plates, \$3. Dr. Karl Darrow is America's best expositor of the significance of the science of physics. His particular forte is to take important but highly technical papers and make clear their meaning and relation to other work in the same field of physics. Characteristic is his disregard of stooping methods to reach the lower level of readers, so that his books stand midway between the original research reports and the so-called "popular" books. In the present book, Dr. Darrow collects and amplifies his lectures at the Lowell Institute of Boston which bring physical discovery up to date. The title comes from the analogy between present-day physical research accomplishments and the mediaeval renaissance in literature and the arts. The science of physics, points out Dr. Darrow, is the uncredited mother of many of the applied sciences, for physicists turn into all manner of engineers. Hence, the well known difficulty of explaining to a layman just what kind of animal a physicist is.

Science News Letter, October 17, 1936

Seismology

EARTHQUAKE INVESTIGATIONS IN CALIFORNIA, 1934-1935—U. S. Coast and Geodetic Survey—*Govt. Print. Off.*, 231 p., 35c. The collaborating contributors of this bulletin list up a rostrum of the most brilliant names in geophysics in the United States, with a couple of notable additions from Japan. The publication, therefore, will be of much interest to seismologists everywhere, as well as to public planners and administrators, engineers, architects, etc., on the Pacific Coast.

Science News Letter, October 17, 1936

General Science

THE SCIENCE OF EVERYDAY LIFE—Edgar F. Van Buskirk, Edith L. Smith and Walter L. Nourse—*Houghton Mifflin*, 634, xviii p., \$1.60. A well illustrated and effective general science text for high-school use, and an everyday science vocabulary is a novel feature.

Science News Letter, October 17, 1936

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